Dispersion in Analysts' Recommendations and International Stock Markets

By Jun Ma, Wanyi Yang[1]

Abstract

This paper shows that country-level disagreement measured from single stock recommendation dispersion is negatively related to future realized market returns. A trading strategy based on last month's aggregate analyst dispersion yields an abnormal return of around 0.7 percent per month. This paper also provides evidence that growth stocks show higher level of overpricing compared to value stocks. The aggregate difference of opinion remains significantly negatively related to market returns after allowing time-varying risk exposure. However, countries with more binding short sale constraints do not show lower expected market returns.

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1. Introduction

Miller (1977) argues that if short sale restrictions are binding, stocks can become overpriced when investors have different opinions. This overpricing result is because pessimistic investors are constrained when they want to sell more shares than they hold, and the security price is therefore set by the most optimistic investors.

Several empirical studies test Miller's theory from different perspectives and show mixed support. In the next section, a brief literature review is conducted. Among these studies, Yu (2011) takes an aggregate perspective and finds a negative relationship between lagged aggregate analyst forecast dispersion and stock market returns. [2] After controlling for variables correlated with the market return, the effect of disagreement is still robust.[3] Yu's study is the first to look at the role of the dispersion aggregated at the country level. However, this study is limited to the U.S. stock market.

This study extends Yu's paper by examining the asset pricing implication of aggregate analyst dispersion at the country level. Unlike Yu (2011), I look at the cross-country dispersion differences. I use Institutional Brokers' Estimate System (IBES) analyst recommendations for stocks from 33 countries for the period from January 1994 to June 2015 to construct a measure of monthly average country-specific analyst recommendation dispersion. In the base case, I focus on the value-weighted average analyst dispersion using three-month outstanding recommendations and one-month-ahead stock market returns.[4] A trading strategy of buying market indices of countries in the lowest analyst dispersion quintile and selling market indices of countries in the highest analyst dispersion quintile yields a monthly abnormal return of 0.78% (t-statistic = 2.53) based on the international asset pricing model of Brusa, Ramadorai, and Verdelhan (2014) and a monthly abnormal return of 0.72% (t-

[2] Goetzmann and Massa (2001) use the different choices among S&P 500 Index Fund investors as a direct proxy of differences of opinion and show that heterogeneous beliefs act as a robust risk factor and can explain part of the returns that are not accounted for by the standard asset pricing factors.
[3] For the variables that correlated with the market, see Campbell and Thompson (2008) and Goyal and Welch (2008).
[4] Unlike Yu (2011), I do not use the earnings per share long-term growth forecasts in the main test because of limited availability of international data.

statistic = 2.14) based on the international five-factor asset pricing model of Fama and French (2016). However, when including the global momentum factor, abnormal returns are not significant. I also present results in a panel setting that allows for time variation in the risk exposures of international stock markets.

Based on Miller's theory, a stock simultaneously experiencing differences of opinion and short selling restrictions will be overpriced. To test whether this story applies to the stock market as well, I consider country-level short sale constraints in the next set of tests. Specifically, I start by treating the legality of short selling activities in the stock market as a measure of country-level short sale constraint. I also discuss other forms of restriction, including the feasibility of short selling activity and the availability of stock market index derivatives. The coefficients of the interaction between short sale constraint and analysts' dispersion are not significant, indicating that the existence of short sale constraints is not a necessary condition for a country's stock market to be overvalued. One possible explanation would be that the rational traders are uncertain about when their peers will exploit this arbitrage opportunity, so they prefer not to correct the mispricing immediately because of the possible substantial holding cost. Without synchronized shorting of the underperformed markets, the pessimistic views about the stock markets cannot be reflected in the prices during the subsequent periods (Abreu and Brunnermeier, 2002).

This paper contributes to the literature by demonstrating that aggregate analyst recommendation dispersions are negatively related to cross-sectional future stock market returns. I also introduce a new measure of differences of opinion in analyst stock recommendations, which are directly linked to analyst views of future stock price movements. Also, stock recommendations are more comparable across different companies compared to the earnings forecasts since recommendations are standard ratings ranging from one to five. I also investigate whether the negative relationship between the dispersion and future stock market return discussed by Yu (2011) exists in other countries. I do this by using an extensive sample of 33 countries. My results show that

Yu's findings do not apply for countries in general as only seven countries show a significant negative relation and the United Kingdom and China even show a significant positive relation at the 90% confidence level. In particular, the United States does not show the significant negative relation between analyst dispersion and future stock market return. Finally, I provide further evidence that when investors have different opinions, growth stocks show higher levels of overpricing than value stocks, but the difference of the overpricing effects between growth stocks and value stocks is not significantly different from zero.

2. Literature Review

In an influential paper, Miller (1977) argues that as long as the supply of shares is smaller than the demand, the share price will be higher than the average price determined by the whole population. Only when short selling is allowed, can the supply of securities increases in the market in such a way that adverse views are also reflected in the market price.

Diether, Malloy, and Scherbina (2002) are among the first to empirically examine the effect of heterogeneous beliefs on prices. They examine the role of dispersion in analysts' earnings forecasts in predicting the cross-section of future stock returns and show that stocks with higher analysts' earnings forecast dispersions tend to underperform in the future.

Chen, Hong, and Stein (2002) use the breadth of mutual fund ownership as a measure of the extent to which short sale constraints are binding. By defining 'breadth' as the proportion of mutual funds with a long position for each stock in each quarter, they manage to devise a more reliable proxy for how tightly short sale constraints bind. In Miller's theory, the extent of how short sale constraints binding reflects the amount of negative information withheld from the market. When "breadth" is low, many investors are sitting on the sideline without show their pessimistic views about the stock price. Thus the low 'breadth' indicates short sale constraints are tightly binding. They find that reductions (increases) in the breadth of ownership forecast lower (higher) future returns as Miller would predict. However, as they argue themselves, their study fails to entirely control for mutual fund stock picking ability since they focus only on the mutual fund sector and ignore position changes of individual investors.

Boehme, Danielson, and Sorescu (2006) is the first study that simultaneously considers the two necessary conditions for overvaluation discussed by Miller (1977). They employ three different proxies for differences of opinion, namely dispersion of analysts' forecasts, idiosyncratic volatility, and turnover.[5] They find that firms with short sale constraints and a high level of different views among investors consistently experience a significant negative abnormal return of 21% per year on average.

Several studies propose an alternative explanation for the negative relation between dispersion and the future return. For example, Johnson (2004) suggests that dispersion is a proxy for unpriced risk and argues that financial leverage can explain the findings of Diether et al. (2002). Avramov, Chordia, Jostova, and Philipov (2009) find that dispersion effects are about the same across the levered and unlevered companies. Using credit rating downgrades as a proxy of financial distress, they find that the negative relationship between dispersion and future returns only exists in non-investment grade firms and is most pronounced during the credit rating downgrade period. Chen and Jiambalvo (2004) show that the results of Diether et al. (2002) can be explained away by the well-known post-earnings announcement drift phenomenon. Doukas, Kim, and Pantzalis (2006) remove analyst uncertainty factors from the forecast dispersion. They even find a positive relationship between stock returns and differences of opinion. Verardo (2009) tests this issue in a setting of

[5] However, using analyst information to construct the proxy of differences of opinion may fail to capture the average investors' opinion discussed in the theoretical studies. Goetzmann and Massa (2005) construct an investor-based dispersion measurement using investors' account information directly and find that analyst dispersion reflects the investor-based dispersion contemporaneously, which supports the idea that analysts' dispersion is a good proxy for investors' differences of opinion.

momentum strategy. In particular, he finds that momentum profits are higher for portfolios with larger dispersion.

However, most of these studies employ monthly returns and assume that differences of opinion are reduced over several months. Using long-term returns, these studies suffer from the "bad-model" problem discussed in Fama (1998) and might confuse mispricing and risk. Berkman, Dimitrov, Jain, Koch, and Tice (2009) use earnings announcements as events that reduce differences of opinion among investors and calculate three-day excess returns around earnings announcements to capture the effect of dispersion reduction on stock prices.[6] Focusing on short event windows, they show that the negative relationship between analyst dispersion and future returns cannot be accounted for by other factors such as financial leverage, price momentum, and post-earnings announcement drift.

A critical issue in this line of research is whether the differences of opinion measure the uncertainty (risk) or different beliefs. A strand of literature tries to disentangle this issue using unique market settings. For example, Beber, Breedon, and Buraschi (2010) focus on the foreign exchange market where short sale constraints are absent, and differences of opinion regarding the underlying assets are measured directly using currency forecasts. Their results indicate a positive relationship between differences of opinion and subsequent underlying currency returns, suggesting that differences of opinion represent another risk factor. Likewise, Carlin, Longstaff, and Matoba (2014) analyze similar issues in mortgage-based security markets where they can measure the dispersions of the prepayment speed directly. They also find a positive relationship between disagreement and future returns. These papers contribute to the literature by showing that, at least in their particular settings, disagreement measures uncertainty and is priced as a risk factor.

Jiang and Sun (2014) look into this issue from a new perspective and construct the dispersion for a given stock as the distance between the weight in mutual funds' active holdings and that in the

[6] Bamber, Barron, and Stober (1997) show that dispersion of analysts' forecasts of earnings declines after earnings announcements.

benchmark index. They find a positive relationship between dispersion and future stock returns. The mutual fund managers have different levels of information for a given stock. When managers with information advantages receive positive signals, they tend to increase their holdings for this stock relative to other uninformed managers, driving up the dispersion level in the fund industry. In contrast, when informed managers receive negative messages about the stock, they may not be able to sell short due to the binding short sale constraints. So when bad news arrives in the market, the dispersion is smaller. Jiang and Sun (2014) provide a novel explanation for this positive relationship, arguing that the relationship is not conflicting with Miller's prediction since dispersion among mutual fund managers reflects information differences, whereas in Miller's theory investors have the same information set and hold different opinions for exogenous reasons.

As discussed in the introduction, Yu (2011) tests Miller's theory at an aggregate level and finds a negative relationship between dispersion and future stock market returns. However, he fails to consider short selling restrictions in the United States. As one of the two necessary conditions of Miller's theory, country-level short sale restrictions are discussed in several studies, but none of them is connected with the differences of opinion literature. For example, Daouk and Charoenrook (2005) collect data on the legality and feasibility of short selling and the presence of put options in 111 countries worldwide. They find that when countries remove restrictions on short sales the aggregate stock prices increase. Bris, Goetzmann, and Zhu (2007) analyze cross-sectional and time-series information from 46 equity markets around the world and test whether short sales constraints affect market returns. They find that prices incorporate negative information faster in countries without short sale constraints, whereas in countries where short selling is prohibited or not employed, market returns display less negative skewness. However, these measures do not capture other omitted country-level factors. To alleviate this issue, Saffi and Sigurdsson (2010) examine stock level short sale constraints for more than 12,600 stocks across 26 countries and show that short sale constraints impede the process of information being incorporated into prices.

3. Data, variable definitions, and descriptive statistics

This section discusses the data sources and sample selection as well as the construction of aggregate analyst recommendation dispersion measure. It also presents descriptive statistics and the distribution of the analyst dispersion across countries through time.

3.1 Data and sample selection

I obtain analyst recommendations from the I/B/E/S Recommendation Detail files for US stocks and international stocks for the period from January 1994 to June 2015.[7] I select the 33 countries that have more than 10,000 recommendations in I/B/E/S for stocks listed on their domestic stock exchanges and for which data are available from Compustat.[8] Analysts may have individual recommendation scales, but I/B/E/S standardizes recommendations as one (strong buy), two (buy), three (hold), four (sell), and five (strong sell). Following previous studies, I reverse the ordering of the recommendation labels, so that large (small) numbers represent positive (negative) recommendations.[9] Recommendations can be upgrades, downgrades, reiterations, or initial recommendations. Since I focus on the aggregate recommendation dispersions across all firms in a country, the sample consists of all types of recommendations.

To be included in the calculation of aggregate dispersion, a stock must have a CUSIP or SEDOL identifier and is covered by an analyst with a non-missing analyst code. Also, the country domicile code for this firm is available.[10] To calculate the standard deviation of the recommendation, the recommended stock must have at least two outstanding recommendations available.[11]

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[7] For 31 of the 33 countries in our sample, calendar year 1994 is the first full year with recommendations in the I/B/E/S database. Coverage for Russia and Poland starts in July 1997 and June 1995, respectively.

[8] The I/B/E/S recommendations database contains data for stocks from 110 different countries. The 33 countries in our sample represent 95% of all recommendations in the database.

[9] The recommendation must range from one to five.

[10] The announcement date should not be later than the activation date. The activation date is the date the recommendation was recorded by Thomson Reuters. For each company, I obtain the country domicile code from the I/B/E/S Summary History–Company Identification file and match it with the corresponding country name using the I/B/E/S Summary History Manual.

[11] With the three-month outstanding window, on average, about 55% analyst covered stocks are covered by at least two analysts. The average market capitalization increase from 15.7 billion U.S. dollar for all analysts covered stocks to 21.8

I then merge the recommendation data with stock information in Compustat and require that the Gvkey, issue ID, stock prices, the number of shares outstanding, incorporation country code, and exchange country code are available from Compustat. For each firm, I exclude recommendations for the cross-listed issues and retain only share issues with the same exchange and incorporation country codes.[12]

I obtain monthly value-weighted gross total return indices for each of the individual countries and the world market from the MSCI website.[13] I use country returns based on the MSCI index expressed in US dollars in the main tests. For country i and month t, this return is denoted as $MSCI\_Ret\_USD_{i,t}$. I use the one-month US Treasury bill rate as the risk-free rate and obtain global factor returns from Kenneth French's website.[14] Finally, I obtain the monthly currency risk factors, namely the carry factor and the dollar factor, from Adrien Verdelhan's website.[15]

3.2 Proxies for Dispersion of Opinion

The main variable used in this study is the country-level analyst recommendation dispersion. I focus on recommendation dispersion for several reasons. First, analysts issue recommendations mainly based on the earnings long-term growth rate (Bradshaw, 2004) and this earnings long-term growth rate has been used in several studies as the proxy of differences of opinion (for example, Moeller, Schlingemann, and Stulz, 2007; Yu, 2011). However, for most countries, there are limited observations for the earnings per share long-term growth rate. Besides, in contrast to earnings forecasts used in previous studies (Diether et al., 2002), stock recommendations all range from one

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billion U.S. dollar for stocks covered by at least two analysts. This trend is consistent with Diether et al. (2002) and Danielsen and Sorescu (2001) arguing that large firms are covered by more analysts on average.

[12] Because of this requirement, the country-level recommendation dispersion is more likely to be based on recommendations from local analysts. For a sample of 32 countries, Bae, Stulz, and Tan (2008) find that local analysts typically have a significant information advantage over foreign analysts.

[13] See https://www.msci.com/end-of-day-data-search.

[14] See http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html. The global factors are expressed in US dollar values and are based on 23 developed markets.

[15] See http://web.mit.edu/adrienv/www/Data.html. Specifically, I download our data from the Monthly Currency Excess Returns file, where the RX variable is the dollar factor and the HML variable is the carry factor (for details, see Lustig, Roussanov, and Verdelhan, 2011).

to five and thus are comparable across different firms and countries. Moreover, stock recommendations also reflect analyst views on future stock performance directly. Hence, I calculate the value-weighted average of analyst recommendation dispersion across all stocks within each country.

For each firm j, I first calculate the dispersion of recommendations at the end of each calendar month *t*, $DIS_{j,t}$. In the main tests, this dispersion of recommendations at the stock level is defined as the standard deviation of all outstanding recommendations across analysts for a firm *j*, issued a minimum of two days and a maximum of 3 months prior to the end of calendar month *t*, where for each analyst I only use the most recent recommendation. [16]Next, for each country i, I weigh the dispersion of recommendations for each firm j based on the previous month's market capitalization, $Mkt\_Cap_{j,t-1}$, to obtain the aggregate value-weighted average recommendation dispersion for country *i* at the end of month *t*.

$$DIS\_Rec_{i,t} = \sum_{j=1}^{n} DIS_{j,t} * \frac{Mkt\_Cap_{j,t-1}}{\sum_{j=1}^{n} Mkt\_Cap_{j,t-1}} \quad (1)$$

Consistent with Loh and Stulz (2011), I also merge the recommendations with the I/B/E/S Stop Recommendation file to make sure that the outstanding recommendations have not been stopped by the broker. By calculating the value-weighted average recommendation dispersion across all stocks in each country, idiosyncratic shocks in individual stock disagreements will cancel out.

3.3 Descriptive statistics

After imposing the criteria discussed above, I obtain a sample of 1,803,571 analyst recommendations from 33 countries for the period January 1994 to June 2015. Table 1 shows the descriptive statistics of the three-month outstanding period in the sample for each year between 1994 and 2015. Column (1) shows that the number of firms covered each year increases more than 100%

[16] To ensure enough diversification in each country, I require at least 50 firms for each month-country to be included in the sample.

on average during the sample periods. Columns (2) and (3) show the mean and median of the average recommendations for individual stocks. For each year in the sample period, the average recommendation is somewhere between buy and hold (higher than three), which is consistent with the findings of previous studies. Column (4) shows that the recommendation dispersions are relatively stable through years and the dispersion is relatively high at the beginning of the sample period. The last two columns present the average number of analysts issuing recommendations during the previous three months and shows that there were on average more than three analysts covering one firm in the same quarter. [17]

Table 1: Descriptive statistics of analyst recommendations, by year

Column (1) reports the number of firms covered by at least two analysts each year under the three-month outstanding recommendation dispersions construction period. Column (2) shows the annual average recommendation, which is the arithmetic mean of the average recommendation of different stocks across all countries in our sample in each year. Column (3) presents the median of the average recommendations of different stocks across all countries. Column (4) and (5) shows the average and the median of the standard deviation of the recommendation for each stock from all the sample countries. Column (6) and (7) presents the mean and median of the number of analysts issuing recommendations for each covered firm in my sample.

	No. of	Average Recommendations		Recommendation Dispersion		Analysts per Firm	
	Firms	Mean	Median	Mean	Median	Mean	Median
Year	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1994	3,036	3.47	3.50	1.03	1.00	3.49	3.00
1995	3,543	3.35	3.40	1.04	1.05	3.44	3.00
1996	4,762	3.42	3.50	0.97	0.98	3.65	3.00
1997	6,224	3.55	3.60	0.88	0.82	3.49	3.00
1998	7,327	3.60	3.67	0.79	0.71	3.54	3.00
1999	7,495	3.75	3.83	0.77	0.71	3.76	3.00
2000	7,162	3.83	4.00	0.73	0.71	3.63	3.00
2001	7,065	3.59	3.60	0.77	0.71	3.81	3.00
2002	7,330	3.53	3.50	0.78	0.71	4.43	3.00
2003	7,129	3.38	3.43	0.80	0.71	4.19	3.00
2004	7,764	3.49	3.50	0.78	0.71	3.81	3.00
2005	8,329	3.48	3.50	0.79	0.71	3.62	3.00
2006	8,753	3.51	3.50	0.78	0.71	3.63	3.00
2007	9,391	3.57	3.50	0.78	0.71	3.62	3.00
2008	8,962	3.48	3.50	0.80	0.71	3.79	3.00
2009	8,562	3.46	3.50	0.84	0.82	4.12	3.00
2010	8,896	3.65	3.67	0.77	0.71	3.82	3.00

[17] Following Howe et al. (2009), I also split the sample into initial recommendations and revised recommendations The dispersion level through time for the initial recommendation is slightly lower than the dispersion of average recommendation revision whereas the average of initial recommendations is higher than the average of revised recommendations, which indicates analysts are more optimistic on average than when they start covering a stock.

Table 1 Continued

2011	9,266	3.66	3.67	0.75	0.71	3.92	3.00
2012	9,172	3.56	3.50	0.74	0.71	3.89	3.00
2013	8,986	3.55	3.50	0.73	0.71	3.68	3.00
2014	9,162	3.60	3.60	0.71	0.71	3.56	3.00
2015	7,662	3.52	3.50	0.71	0.71	3.70	3.00
Average	7,544	3.55	3.57	0.81	0.76	3.75	3.00

Table 2 shows descriptive statistics for the recommendations for domestic stocks for each country in our sample. Panel A reports the descriptive statistics for G7 countries and other developed countries, and Panel B reports the descriptive statistics for 14 emerging countries.[18] The average number of firms for developed countries is more than twice the average number of firms for emerging countries. Analyst coverage by the I/B/E/S is most extensive for the United States, making up more than 25% of all recommendations. The average number of analysts per firm in developed countries is slightly higher than the average number of firms per analyst in emerging countries.

Columns (4) to (6) of Table 2 report the averages, medians and standard deviations of recommendation scores for each country based on the three-month outstanding construction window. The highest average recommendation is for China (4.10), and the lowest average recommendations are for Finland and New Zealand (3.29). The recommendations are skewed to the left, with a relatively higher median than the average.

To calculate the standard deviation of recommendations per stock, I require that at least two analysts follow the firm. This requirement reduces the total number of observations to around 58% based on the three-month outstanding dispersion formation period. The mean of dispersion in column (7) is the monthly average analyst recommendation dispersion for individual stocks within that country over the whole sample period and varies from 0.62 for China to 1.08 for Thailand. There exists a wide range in the analyst recommendation dispersion across countries. In general, the

[18] Countries are classified based on the MSCI classification (see https://www.msci.com/market-classification).

emerging countries show a more substantial difference, between the 25th and 75th percentile of dispersion range compared to the developed countries. For Korea, the gap between the 25th and 75th percentile is 0.45, whereas the Philippines presents the largest dispersion range of 0.83. To illustrate the evolution of country-level recommendation dispersion over time, Figure 1 plots the monthly average recommendation dispersion for the G7 countries over the sample period. It shows that there are structural differences in the analyst recommendation dispersion among G7 countries over the sample period suggesting that the dispersion difference not be driven by a specific period or unexpected events.

Table 2: Descriptive statistics of analyst recommendations, by country

This table shows the descriptive statistics for analyst recommendations for each country throughout the sample period. Analysts are identified using the I/B/E/S analyst masked code. Column (1) reports the annual average of the number of firms that covered by at least two analysts under the assumption that one recommendation remains valid up to three months if the analyst does not update or issue a new recommendation. The sample period is from January 1994 to June 2015. Panel A reports descriptive statistics for developed countries and Panel B reports descriptive statistics for emerging countries (based on the MSCI country classification).

Panel A: Developed Countries

Country	No. of Firms/Year	Analysts per Firm		Recommendation			Dispersion				
		Mean	Median	Mean	Median	Std.	Mean	Median	Std.	25th	75th
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
G7 countries											
Canada	443	3.43	3.00	3.62	3.67	0.64	0.67	0.71	0.46	0.50	0.96
France	245	4.55	4.00	3.43	3.50	0.70	0.90	0.84	0.49	0.58	1.19
Germany	208	5.09	4.00	3.38	3.43	0.75	0.92	0.94	0.49	0.69	1.21
Italy	112	4.17	3.00	3.40	3.50	0.69	0.81	0.75	0.47	0.58	1.10
Japan	659	3.20	3.00	3.44	3.50	0.66	0.68	0.71	0.50	0.50	0.96
United Kingdom	541	3.91	3.00	3.50	3.50	0.70	0.86	0.83	0.52	0.58	1.15
United States	2,348	3.49	3.00	3.66	3.67	0.66	0.69	0.71	0.48	0.50	1.00
Other developed countries											
Australia	295	3.48	3.00	3.43	3.50	0.72	0.84	0.82	0.53	0.58	1.15
Belgium	56	3.72	3.00	3.40	3.50	0.72	0.81	0.71	0.52	0.58	1.15
Denmark	52	3.84	3.00	3.30	3.33	0.75	0.91	0.89	0.53	0.58	1.26
Finland	67	4.35	3.00	3.29	3.33	0.70	0.89	0.89	0.49	0.58	1.17
Hong Kong	73	5.47	5.00	3.43	3.50	0.75	1.03	1.00	0.51	0.71	1.41
Netherlands	94	4.91	4.00	3.41	3.50	0.73	0.90	0.90	0.48	0.58	1.15
New Zealand	48	2.75	2.00	3.29	3.33	0.73	0.80	0.71	0.59	0.55	1.15
Norway	75	3.88	3.00	3.45	3.50	0.71	0.85	0.76	0.53	0.58	1.15
Singapore	104	4.34	3.00	3.44	3.50	0.84	0.96	0.98	0.57	0.58	1.41
Spain	85	4.78	4.00	3.32	3.40	0.77	0.97	0.96	0.51	0.71	1.27
Sweden	108	4.27	3.00	3.33	3.33	0.69	0.89	0.84	0.50	0.58	1.17
Switzerland	99	4.12	3.00	3.35	3.38	0.65	0.80	0.75	0.50	0.58	1.13
Average	301	4.09	3.26	3.41	3.47	0.71	0.85	0.83	0.51	0.59	1.17

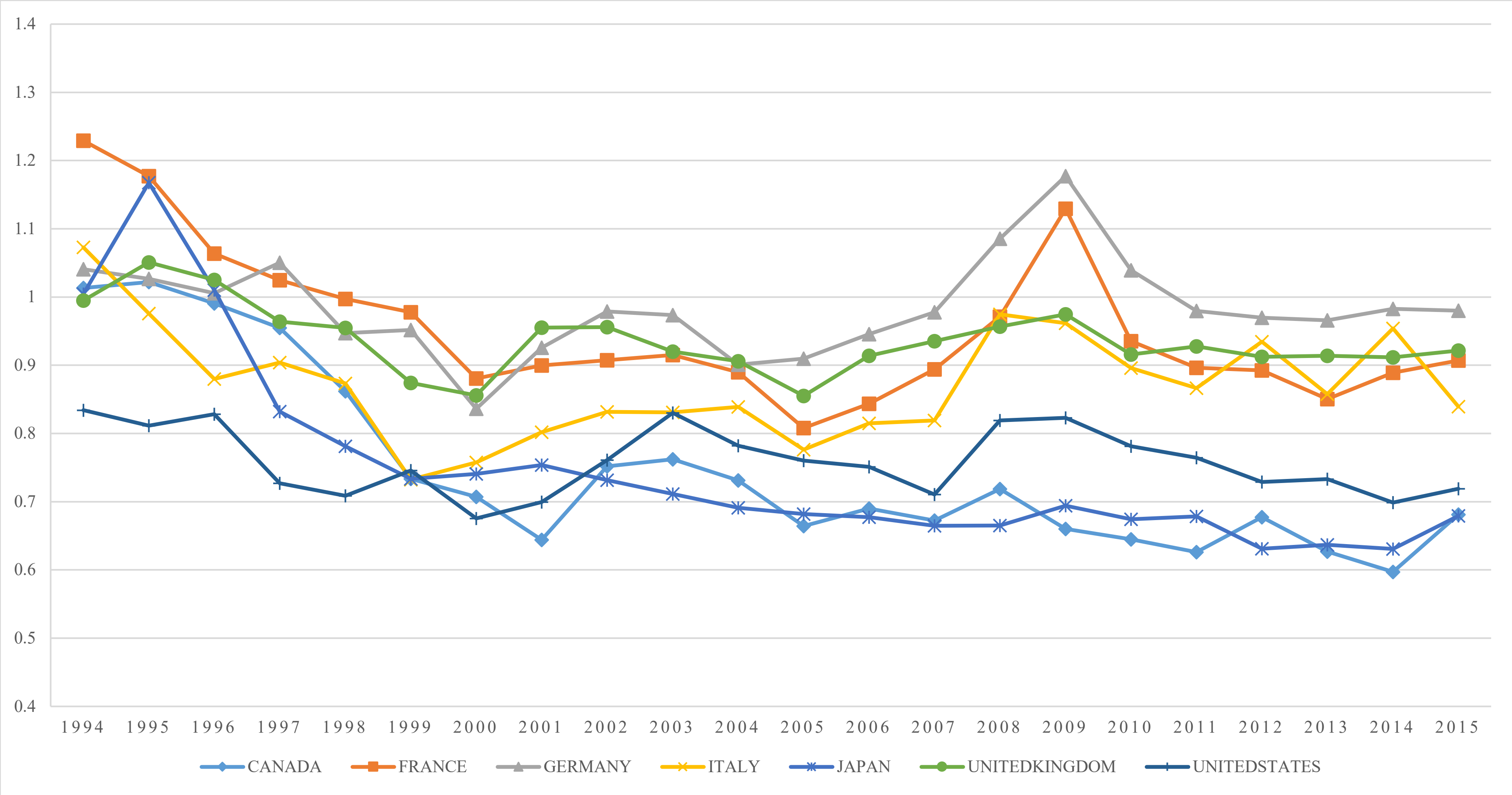
Table 2 Continued

Panel B: Emerging Countries

	No. of	Analysts per Firm		Recommendation			Dispersion				
	Firms/Year	Mean	Median	Mean	Median	Std.	Mean	Median	Std.	25th	75th
Country	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Brazil	111	3.67	3.00	3.50	3.50	0.66	0.77	0.71	0.50	0.55	1.00
China	358	2.95	2.00	4.10	4.20	0.64	0.62	0.58	0.49	0.00	0.82
India	221	4.69	4.00	3.65	3.70	0.82	0.96	0.96	0.56	0.58	1.33
Indonesia	66	3.75	3.00	3.43	3.50	0.91	1.01	1.00	0.60	0.69	1.41
Korea	230	4.49	4.00	3.79	4.00	0.64	0.74	0.71	0.46	0.55	1.00
Malaysia	143	4.13	3.00	3.38	3.50	0.86	0.99	1.00	0.58	0.71	1.41
Mexico	49	3.27	3.00	3.55	3.63	0.77	0.81	0.71	0.53	0.58	1.15
Philippines	43	3.28	3.00	3.48	3.50	0.89	0.98	0.96	0.64	0.58	1.41
Poland	46	3.50	3.00	3.30	3.33	0.77	0.91	0.89	0.56	0.58	1.29
Russia	62	3.18	3.00	3.50	3.50	0.76	0.83	0.71	0.54	0.58	1.15
South Africa	110	3.13	3.00	3.38	3.50	0.78	0.88	0.82	0.59	0.58	1.29
Taiwan	204	3.78	3.00	3.53	3.50	0.77	0.86	0.82	0.55	0.58	1.15
Thailand	126	3.87	3.00	3.35	3.50	0.94	1.08	1.05	0.64	0.71	1.41
Turkey	75	3.55	3.00	3.49	3.50	0.69	0.79	0.71	0.51	0.58	1.14
Average	132	3.66	3.07	3.53	3.60	0.78	0.87	0.83	0.55	0.56	1.21

Figure 1: Analyst dispersion in G7 countries

This figure shows the value-weighted analyst recommendation dispersions in G7 countries. The calculation of the country level dispersion is the bottom up value-weighted recommendation dispersions across all the firms based on all outstanding recommendations that were not stopped and were issued a minimum of two days and a maximum of three months before the end of calendar month t. The sample period is from January 1994 to June 2015, and the recommendations range from one (strong sell) to five (strong buy).



Panel A (B) of Table 3 presents descriptive statistics for the monthly stock market returns in US dollars for each of the developed (emerging) countries in our sample. The highest average return across all countries is for Russia, at 1.99% per month, and the lowest average return is for Japan, at 0.27% per month. The results also show that emerging markets have higher average monthly returns and are more volatile (the mean return is 1.02% per month, with an average standard deviation of 10.32% per month) compared to developed markets (a mean return of 0.86% per month with an average standard deviation of 6.33% per month).

Table 3: Descriptive statistics for stock market returns

This table presents descriptive statistics for the monthly MSCI stock market returns in US dollars. I use the MSCI Gross Index from the MSCI website. The sample period is from January 1994 to June 2015. All the numbers in the table are percentages. Panel A reports descriptive statistics for developed countries and Panel B reports descriptive statistics for emerging countries (based on the MSCI country classification).

Panel A: Developed Countries

Country (1)	Mean (2)	Median (3)	Max (4)	Min (5)	Std. (6)	Num. of Obs. (7)
Australia	0.92	1.19	17.79	-25.51	6.05	258
Belgium	0.82	1.45	18.19	-36.56	6.05	258
Canada	0.94	1.51	21.26	-26.94	5.85	258
Denmark	1.20	1.80	18.34	-25.67	5.75	258
Finland	1.37	1.16	33.26	-31.76	9.38	258
France	0.75	1.13	15.74	-22.41	5.90	258
Germany	0.84	1.26	23.69	-24.35	6.61	258
Hong Kong	0.76	0.85	33.23	-28.86	7.22	258
Italy	0.68	0.56	19.67	-23.60	6.99	258
Japan	0.27	0.22	16.79	-14.78	5.25	258
Netherlands	0.85	1.39	14.39	-25.11	5.84	258
New Zealand	0.71	1.29	18.04	-22.44	6.29	258
Norway	1.00	1.34	21.47	-33.36	7.66	258
Singapore	0.67	0.80	25.84	-28.99	7.25	258
Spain	1.02	1.29	22.09	-25.27	6.99	258
Sweden	1.22	0.88	25.49	-26.66	7.44	258
Switzerland	0.91	1.30	14.56	-15.63	4.79	258
United Kingdom	0.65	0.70	13.87	-18.96	4.59	258
United States	0.84	1.32	10.99	-17.10	4.32	258
Average	0.86	1.13	20.25	-24.95	6.33	-

Table 3 Continued
Panel B: Emerging Countries

Country (1)	Mean (2)	Median (3)	Max (4)	Min (5)	Std. (6)	Num. of Obs. (7)
Brazil	1.45	1.88	36.78	-37.63	11.05	258
China	1.18	0.99	28.59	-25.08	8.56	174
India	1.02	1.17	36.68	-28.48	8.66	258
Indonesia	1.05	1.19	55.58	-40.54	12.57	258
Korea	1.07	0.25	70.60	-31.25	10.98	258
Malaysia	0.51	0.82	50.04	-30.20	8.23	258
Mexico	0.95	1.77	19.14	-34.25	8.28	258
Philippines	0.50	0.59	43.39	-29.22	8.54	258
Poland	0.76	0.92	40.21	-34.82	10.96	258
Russia	1.99	2.05	61.13	-60.57	15.16	246
South Africa	1.02	1.17	19.45	-30.51	7.67	258
Taiwan	0.58	0.73	29.24	-21.73	8.00	258
Thailand	0.65	0.70	43.24	-34.01	10.87	258
Turkey	1.56	1.59	72.30	-41.24	14.89	258
Average	1.02	1.13	43.31	-34.25	10.32	-

4. Empirical setting

4.1 Calendar time portfolio strategy

The primary hypothesis is based on Miller (1977) but in an international setting. I test whether the difference in the level of analyst dispersion across countries helps to predict stock market performance in the future. I expect that if the degree of analyst dispersion is relatively high in one country, that country will perform worse than others in next period. To test this idea, I implement a simple strategy that buys 'winners' (countries with a relatively low analyst dispersion) and sells 'losers' (countries with a relatively high analyst dispersion).

Following earlier papers that examine individual stock recommendations within a country (e.g., Barber et al., 2001; Jegadeesh et al., 2004), I split all countries into quintile portfolios based on the relative position of the average country recommendation dispersion observed at the end of month *t-1*. For each portfolio, I then calculate the return for month *t* as the equally-weighted average market return across all countries in the portfolio.[19] My main test is based on a zero-cost portfolio that takes a long position in the quintile of countries with the lowest dispersion and a short position in the quintile of countries with the highest dispersion.

To examine the profitability of the trading strategy I use four different international asset pricing models. First, I use a simple world-CAPM, which incorporates the global market return (in USD) but does not account for currency risk (see, Sharpe, 1964; Lintner, 1965). Second, I use the International CAPM Redux model presented in Brusa et al. (2015), which in addition to the global market return includes a carry factor and a dollar factor to capture the exchange rate risk faced by US-based investors.[20] Third, I use the international three-factor asset pricing model plus the global momentum factor. Finally, I use international five-factor asset pricing model presented in Fama and French (2016).[21]

More specifically, for each portfolio, I estimate the following four time-series models for PR_t, the monthly portfolio return (in USD) in month *t*:

Model 1 is the world-CAPM. RF_t is the 30 days U.S. T-bill rate in month *t*, and $WMKT_t$ is the excess return on the world market portfolio in month *t,* denominated in USD.

$$PR_t - RF_t = \alpha + \beta_1 * WMKT_t + \varepsilon_t \tag{2}$$

Model 2 is the International CAPM Redux. $LWMKT_t$ is the month *t* excess return on the world market portfolio denominated in local currencies. The dollar factor is defined as the average change in the exchange rate between the U.S. dollar and all other currencies, and the carry factor is

[19] The results of value-weighted country portfolio are similar but weaker. The portfolio returns are robust ro CAPM Redux model only.
[20] See also Lustig et al. (2011) and Verdelhan (2015).
[21] Brusa et al. (2015) compare the performance of several international asset pricing models and find that International CAPM Redux model outperforms the World CAPM and the Fama-French three factor model. While they do not examine the Fama French five factor model, evidence in Fama and French (2016) suggests that the five factor model displays the same (limited) ability to explain variation in international stock market returns as the international three factor model.

defined as the difference in exchange rates between baskets of high and low-interest rate currencies (Lustig et al., 2011).

$$PR_{i,t} - RF_t = \alpha + \beta_1 * LWMKT_t + \beta_2 * Dollar_t + \beta_3 * Carry_t + \varepsilon_t \quad (3)$$

The third model is an extension of the global Fama-French three-factor model which also includes the global momentum factor. SMB_t is the return on a value-weighted portfolio that contains long position of small-cap stocks and short position of large-cap stocks; HML_t is the return on a value-weighted portfolio that buying value stocks and selling growth stocks; MOM_t is the cumulative stock market return over the past 12 months.

$$PR_{i,t} - RF_t = \alpha + \beta_1 * WMKT_t + \beta_2 * SMB_t + \beta_3 * HML_t + \beta_4 * MOM_t + \varepsilon_t \quad (4)$$

Model 4 is the five-factor international asset pricing model proposed in Fama and French (2016). Apart from the three Fama-French factors discussed above, RMW_t (Robust Minus Weak) is the return on a value-weighted portfolio, that contains long position of robust operating profitability stocks and short position of weak operating profitability stocks; CMA_t (Conservative Minus Aggressive) is the average return on a value-weighted portfolio that buying conservative investment stocks and selling aggressive investment stocks (Fama & French, 2016).

$$PR_t - RF_t = \alpha + \beta_1 * WMKT_t + \beta_2 * SMB_t + \beta_3 * HML_t + \beta_4 * RMW_t + \beta_5 * CMA_t + \varepsilon_t \quad (5)$$

4.1.1 Portfolio Strategy Results

Panel A in Table 4 reports the monthly abnormal returns (alphas) for the various portfolios, for each of the four international asset pricing models. Group 5 represents the group of countries with the highest analyst dispersion, and Group 1 accounts for the group of countries with the lowest analyst dispersion. As discussed, the self-financing hedge portfolio buys Group 1 countries and sells Group 5 countries.

For each pricing model, I find that countries with the highest level of analyst dispersion tend to perform worse than other countries. For example, for the International CAPM Redux, Group 5 obtains a significant negative alpha of -0.63% per month. The zero-cost hedge portfolio alpha from the CAPM Redux is 0.78% per month, indicating a substantial outperformance of our simple trading strategy based on country-level analyst dispersion. However, the alpha from Groups 1 to 5 does not show a monotonically decreasing trend. Instead, the total portfolio return mainly comes from taking a short position in the most dispersed group of countries.[22] The results based on the global Fama-French five-factor model provide similar evidence that the global five factors can not explain the gross returns on our proposed trading strategy of buying winner countries and selling loser countries and that the returns are mainly coming from the short side. However, the abnormal returns can be explained mostly by the global momentum factor. Hence, I conclude that analyst dispersions aggregated at the country level only provide limited information regarding the future cross-section of international stock market returns. This finding provides weak support for Miller's theory and is inconsistent with Yu (2011).[23]

Panel B of Table 4 presents the monthly summary statistics for each group. To get the average dispersion, I first calculate the average dispersion for each group in each month and then take the monthly average of those dispersions for each group. The average market capitalization is calculated similarly. It shows that the raw market returns are negatively related to the dispersion level in each group. Moreover, the average market size also decreases with the increase of the dispersion level, which is consistent with the firm-level evidence that small companies are more likely to have a higher level of dispersions.

[22] Equal weighted analyst dispersion provides much weaker results and abnormal returns are not significant with each of the four asset pricing models.

[23] The hedge returns based on dollar neutral long-short portfolios where the weight for each country index in each month is based on that country's recommendation ranking in the previous month (see Asness, Moskowitz, and Pedersen, 2013) are similar. For details of this method, see Chapter 1 section 3.

Table 4: Monthly abnormal returns for long–short recommendation portfolios

This table presents the monthly percentage abnormal returns (alphas) earned by the portfolios formed based on the rank of country-level aggregate analyst dispersions. I require at least 50 firms for each month–country to be included in the sample. The world CAPM alpha is the estimated alpha from a time series regression of the portfolio excess return (RP–RF) on the global market excess return, denominated in US dollars (WMKT). The alpha for the international CAPM redux is the estimated alpha from a time series regression of the portfolio excess return on the world market excess return, denominated in local currencies (LWMKT) and two currency risk factors, Dollar and Carry. The global FF3 plus MOM alpha is estimated alpha from a time series regression of the portfolio excess return on WMKT, SMB, HML and momentum factor. The global Fama–French five-factor (FF5) alpha is the estimated alpha from a time series regression of the portfolio excess return on WMKT, SMB, HML, and two additional factors: the variables RMW (robust minus weak), and CMA (conservative minus aggressive). The sample period is from January 1994 to June 2015. Panel B shows the monthly average summary statistic for each group. To get the average dispersion, I first calculate the average dispersion value for each group in each month and then calculate the monthly average of the value of dispersion. The average market capitalization is calculated similarly. Coefficients highlighted in **bold** are significant at the 10% level or better.

Panel A: Calendar Time Portfolio Returns

Portfolio	World CAPM (1)	CAPM Redux (2)	Global FF 3+Mom (3)	Global FF5 (4)
1 (lowest dispersion)	0.213	0.154	0.242	0.182
	1.13	0.82	1.24	0.91
2	0.143	0.102	0.119	-0.022
	0.83	0.59	0.69	-0.12
3	0.012	-0.026	-0.05	-0.059
	0.07	-0.15	-0.28	-0.32
4	0.254	0.080	0.296	0.176
	1.24	0.41	1.50	0.85
5 (highest dispersion)	-0.250	**-0.629**	-0.221	**-0.540**
	-0.83	-2.26	-0.72	-1.69
P1-P5	0.463	**0.783**	0.463	**0.722**
	1.49	2.53	1.43	2.14

Panel B: Portfolio Characteristics

	Low	2	3	4	High
Average dispersion	0.691	0.828	0.914	0.998	1.137
#of countries	5	6	6	6	5
Average market capitalization (in 10^{12} \$US)	5.133	2.8613	1.255	1.201	1.783
Average stock market return (%)	0.909	0.872	0.797	1.065	0.545

4.1.2 Portfolio Rebalancing

The trading strategy in the previous section needs monthly rebalancing. To show how the countries move across different quintile groups, Table 5 presents the transition matrix based on monthly rebalancing. Each cell in the transition matrix shows the percentage of countries that change from the quartile group in the previous month (the rows) to the quartile group in the current month (the columns). If focusing on the most extreme group, I see that around 60% of the countries in the group of highest (lowest) analyst dispersion in a month are still in the same group in the following month. There is still a reasonable level of portfolio turnover indicating the hedge portfolio returns are not mainly driven by a few countries.

Table 5: Portfolio Rebalancing

Table 5 presents the transition matrix based on monthly rebalancing. Each cell in the transition matrix shows the percentage of countries that change from the quartile group in the previous month (the rows) to the quartile group in the current month (the columns).

	Current Month's Quintile				
Last Month's Quintile	1	2	3	4	5
1	65.46	21.68	8.00	3.22	1.65
2	18.97	40.91	24.84	11.59	3.69
3	6.79	25.14	34.47	24.42	9.18
4	2.96	11.12	24.77	38.19	22.96
5	1.77	3.93	9.39	24.71	60.20

4.2 Analyst dispersion and time-varying returns

4.2.1 Dispersion and cross-sectional future market returns

Yu (2011) documents that in the United States aggregate disagreement is negatively related to the ex-post excess stock market return. I test whether this prediction holds in other markets as well as in the cross-section of different countries globally. In this section, I start with a panel regression that considers the cross-sectional predictability of aggregate differences of opinion on future market returns and then brings the country-level short sale constraints into my analysis.

Bursa et al. (2015) show that there are significant differences across international stock markets in both the magnitude of risk exposure and the degree to which these risk exposures vary over time (see also Dumas and Solnik, 1995). To account for this time-variation in risk exposures in empirical tests, I use the following procedure to calculate the abnormal return of the stock market of each country i in month t. First, for each country i and each month t, I use the previous 60 months and run a time-series regression to estimate the relevant factor loadings for the CAPM Redux model discussed previously.[24] I then multiply the relevant factor loadings with the corresponding factor realization in month t to obtain, $Expect\_Ret_{i,t}$, the predicted stock market return for country i in month t. Finally, I subtract this predicted return from the realized return and obtain the unexpected market return. This unexpected market return in month *t* for country *i*, $Unexpect\_Ret_{i,t}$, is then used as the dependent variable in the subsequent panel regression. Figure 2 shows the scatter plot of next period's unexpected market return (based on CAPM Redux) against aggregate dispersion.[25] A relationship shown in the graph also motivates the following initial model.

I also present the results for different varieties of the following base panel regression:

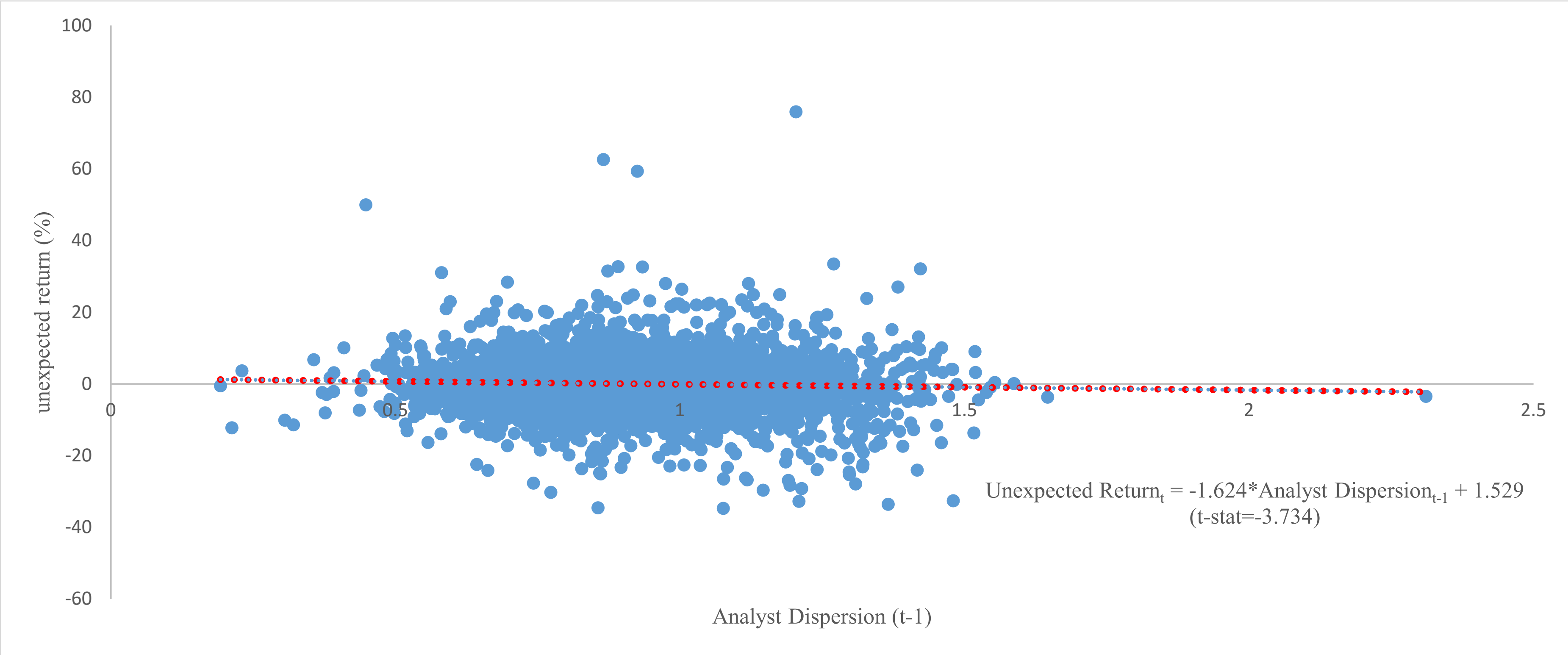
$$Unexpect\_Ret_{i,t} = \alpha + \beta_1 * Rank\_DIS_{i,t-1} + \beta_2 * Momentum_{i,t} + C_i + M_t + \varepsilon_{i,t} \quad (6)$$

where $Rank\_DIS_{i,t-1}$ indicates the relative position of the country-level dispersion of recommendation each month. To obtain this rank value, I sort dispersions of recommendation into five groups and allocate a value that ranges from -0.5 for the smallest quintile to +0.5 for the largest quintile.[26] $Momentum_{i,t}$ measures the abnormal return for country i over the previous 6 months (*t-1, t-6*). To alleviate the concern that there may exist some time-invariant variables that relate to future returns, I include country fixed effects in the analysis. The variables C_i indicates country fixed effects and M_t indicates month fixed effects.

[24] As the Fama-French Five factors are available from July 1990, in order to get enough data for estimation, our sample period for this part is from July 1995 to June 2015.
[25] I only show the CAPM Redux results from now. The Fama-French Five Factor model shows similar results. However, the World CAPM and Global Fama-French Three Factor plus Momentum do not work. For details, see Appendix A.
[26] I use ranks instead of the actual average recommendation dispersion to be consistent with the portfolio construction criteria. Similar results are obtained if I use the actual average recommendation dispersion itself independent of whether or not I winsorize the actual dispersion level at 1% and 99%.

Figure 2: Analyst dispersion and ex-post unexpected market return

This figure shows the scatterplot of dispersion and ex-post one-month unexpected (based on CAPM Redux) stock market return. To account for this time-variation in risk exposures in our empirical tests, I use the following procedure to calculate the abnormal return of the stock market of each country *i* in month *t*. First, for each country *i* and each month *t*, I use the previous 60-months and run a time-series regression to estimate the relative factor loadings for the international CAPM Redux model. I then multiply the relevant factor loadings with the corresponding factor realization in month *t* to obtain, $Expect\_Ret_{i,t}$, the predicted stock market return for country *i* in month *t*. Finally, I subtract this predicted return from the realized return and obtain the unexpected market return.



The results in the first two columns of Table 6 indicate that aggregate analyst dispersion is negatively related to the next month's unexpected stock market return (t-value=-2.39 based on standard errors for country-level clustering).

Next, the regression controls for the country-level average recommendation from the previous month as Berkman and Yang (2017) find that aggregate analyst recommendation can predict next month stock market unexpected return. So it is useful to see whether the analyst dispersion provides additional predictability in addition to the average recommendation,

$$Unexpect\_Ret_{i,t} = \alpha + \beta_1 * Rank\_DIS_{i,t-1} + \beta_2 * Rank\_REC_{i,t-1} + \beta_3 * \ Momentum_{i,t} + C_i \ + M_t \ + \varepsilon_{i,t} \quad (7)$$

The result is shown in the third and fourth columns of Table 6 Dispersion remains significantly negatively related to the future unexpected stock market returns, whereas the aggregate analyst recommendation is a strong predictor of the next month's unexpected stock market return.

As Miller (1977) hypothesizes that dispersion of investor opinions in the presence of short sale constraints leads to stock price overvaluation, I include short-selling restrictions around the world as the second condition of my analysis. Jarrow (1980) also claims that market-wide short sale constraints may lead to the overpricing of the entire stock market. I first use the legality of the short selling activity in the stock market as a measure of country-level short sale constraint. If Miller's theory holds at the country level, the return differences between low and high dispersed country portfolios will be higher when short sale constraints are binding tightly.

To test this hypothesis, I introduce $Illegal_{i,t}$ and $Illegal_{i,t} * Rank_DIS_{i,t-1}$variable in the panel regression. $Illegal_{i,t}$ is a dummy variable, which equals one if short selling is legally prohibited in the stock market and zero otherwise. Following Jain, Jain, and Mclnish (2012), I allow $Illegal_{i,t}$ to vary across time for countries that changed their short selling rules during the sample period (eight countries changed their shorting selling bans during the sample period).

Because I use monthly data, I assume such countries have short selling constraints for the whole month if they have short-selling bans for several days in a month. Moreover, since Boehme et al. (2006) find systematic overvaluation for stocks that are subject to both conditions simultaneously whereas stocks are not consistently overpriced when they subject to only one condition, I examine the valuation effects of the interaction between differences of opinion and short sale constraints

$$Unexpect\_Ret_{i,t} = \alpha + \beta_1 * Rank\_DIS_{i,t-1} + \beta_2 * Rank\_REC_{i,t-1} + \beta_3 * Momentum_{i,t} + \beta_4 * Illegal_{i,t} + \beta_5 * Illegal_{i,t} * Rank\_DIS_{i,t-1} + C_i + M_t + \varepsilon_{i,t} \quad (8)$$

The results are shown in Table 6 Column (5). The analyst dispersion coefficient remains significantly negatively related to the unexpected stock market returns with a coefficient of -0.39 (t-statistics is -1.82). However, the coefficient of interaction variable is negative but not significantly different from zero, indicating that there is no evidence to support the hypothesis that having the same high dispersion level, countries with short sale constraints go down more than countries without short sale restrictions.

One potential concern with the dispersion variable is that it may be correlated with some unknown country characteristics that are related to the stock market returns. Thus, the results based on analysts' dispersion may be due to several omitted variables. Table 6 Column (6) shows that the negative coefficient on analysts' dispersion becomes more significant after the inclusion of country fixed effect. This result indicates the negative relationship between analysts' dispersion and future market returns are not contaminated by other omitted variables.

Table 4 Panel A shows the overpricing effects mainly come from the group with highest analyst dispersion. Thus, I run the following regression to capture the effect within the most dispersed group 5,

$$Unexpect_{Ret_{i,t}} = \alpha + \beta_1 * Rank\_REC_{i,t-1} + \beta_2 * Momentum_{i,t} + \beta_3 * Illegal_{i,t} + \beta_4 * Illegal_{i,t} * Q5 + C_i + M_t + \varepsilon_{i,t} \quad (9)$$

Where $Q5$ is a dummy variable, which equals one if a country is in the most dispersed quintile (Group 5) but otherwise equals zero. The results in columns (7) and (8) in Table 6 show that the countries with the highest aggregate dispersions show significantly negative market returns in the following month and that the coefficient of the interaction variable again is not significantly different from zero. This result indicates that the extent of the average decrease in stock market indices of high dispersion countries does not depend on whether the countries are short sale constrained or not.

Apart from legal bans, other forms of shorting restrictions include specific trading mechanisms (uptick rules), pre-borrowing requirements (ban on naked short selling), and bans on shorting of selected stocks (typically financial stocks) discussed by Jain et al. (2013). In the panel regression, I create a *Ban* variable ranging from zero to three indicating the feasibility of short selling activities, where zero indicates short selling is feasible in the particular country and three means short selling is banned within that country, a value of one and two indicate intermediate levels of short selling feasibility.

$$Unexpect\_Ret_{i,t} = \alpha + \beta_1 * Rank\_DIS_{i,t-1} + \beta_2 * Rank\_REC_{i,t-1} + \beta_3 * Momentum_{i,t} + \beta_4 * Ban_{i,t} + \beta_5 * Ban_{i,t} * Rank\_DIS_{i,t-1} + C_i + M_t + \varepsilon_{i,t} \quad (10)$$

Table 6 Columns (9) and (10) show that when including $Ban_{i,t}$, the coefficient of analyst dispersion is still negatively related to the unexpected return but becomes insignificant whereas the aggregate analyst recommendation remains a strong predictor of the next month's market return. Similar to the results of using the $Illegal_{i,t}$ variable, the coefficient of the interaction between the short selling restrictions and analyst dispersions is not significantly different from zero.

The third way in which I proxy country level short selling restrictions is the availability of stock market index derivatives, such as index futures (Charoenrook and Daouk, 2005). Index futures allow investors to take short positions in the country indices without short selling directly. If there are stock index futures available in a particular country, I regard that country as one where short selling activity is feasible. I obtain the start date of country index futures trading from *Investing.com*, which provides the real-time CFD futures price of different countries. I treat the earliest available date as the listing date of the stock indices futures, and I obtain the information of 27 countries' stock indices futures.[27]

Columns (11) and (12) in Table 6 provide the results using this alternative short selling binding variable. Under this measure of short sale restrictions, I find that although the dispersion is still negatively related to the next period's unexpected stock market return, the relationship is no longer significant.

The above results show that analyst dispersion, when aggregated at the country level, is negatively related to the ex-post unexpected stock market return. However, short sale constraints are not a necessary condition for a country's stock market to display overpricing. A possible explanation could be that rational traders are uncertain about when their peers will exploit this arbitrage opportunity, so they prefer not to correct the mispricing immediately because of the possible large holding cost. Without synchronized shorting of the underperformed markets, the pessimistic views about the stock markets cannot be reflected in the prices during the subsequent periods.

4.2.2 Earnings Announcement Month

Miller's (1977) model suggests that if a group of investors is facing short sale constraints, higher dispersions result in the overvaluation of stocks. Since differences of opinion among investors will be narrowed if new information arrives, overvaluation is predicted to decrease during the earnings announcement months. In this section, I define the earnings announcement month as the most common month for firms to issue earnings announcements in each country each year, enabling capture of the average effect of the earnings announcement. I then run the following regression with a dummy variable Ea_Month that equals to one if the observation is from the most typical earnings

[27] For India, Indonesia, Malaysia, New Zealand, Philippines and Thailand, I cannot get information about the country indices futures.

announcement month and an interaction variable $Ea\_Month * Rank\_Dis_{\ i,t-1}$ to measure the effect of earnings announcement on the relationship between analyst dispersion and future stock market returns,

$$Unexpect\_Ret_{i,t} = \alpha + \beta_1 * Rank\_DIS_{i,t-1} + \beta_2 * Rank\_REC_{i,t-1} + \beta_3 * Momentum_{i,t} + \beta_4 * Ea\_Month + \beta_5 * Ea\_Month * Rank\_Dis_{\ i,t-1} + C_i + M_t + \varepsilon_{i,t} \quad (11)$$

The last column of Table 6 shows that the coefficient of the interaction variable is 0.454 (t-statistic equals 0.76), which means that on average there is no difference in the extent of overvaluation between the most typical earnings announcement month and other months.

Table 6: Regression results using unexpected stock market returns and country-level aggregate dispersion

This table presents the results for equations (6) to (11) in the text. The dependent variable is the unexpected return based on CAPM Redux model. The variable $Rank\_DIS_{i,t-1}$ refers to the relative position of the country-level recommendation dispersion each month, where all aggregate dispersions are sorted into five groups. I assign ranks ranging from -0.5 for the smallest quintile to +0.5 for the largest quintile. $Rank\_REC_{i,t-1}$ is also calculated in the similar way but with average recommendation. $Illegal_{i,t-1}$ from column (5) to (8) is the dummy variable where equals to one if the short selling is illegal in a particular month for a particular country. $Futures_{i,t-1}$ is the dummy variable where equals to zero if there is stock market index futures available for the country in that month. $Ban_{i,t}$ is the variable considering the feasibility of short selling activity. Apart from legally banned or not, uptick rules, pre-borrowing requirements (ban on naked short selling), and bans on shorting selected stocks (typically financial stocks) are also considered. *Q5* is the dummy variable that equals to 1 if the countries are in the highest dispersed group and equals to 0 otherwise. *Ea_Month* is the dummy variable that equals to one if it is the most typical earnings announcement month. The sample period is from July 1995 to June 2015. The t-statistics are based on standard errors clustered by country. Coefficients highlighted in **bold** are significant at the 10% level or better.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	-0.643	**-0.665**	**-0.501**	**-0.526**	**-0.390**	**-0.602**			-0.111	-0.441	-0.462		**-0.566**
$Rank\_DIS_{i,t-1}$	-2.79	-2.39	-2.08	-1.87	-1.82	-2.51			-0.29	-1.00	-1.09		-2.13
			0.530	**0.805**	**0.613**	**0.854**	**0.595**	**0.807**	**0.693**	**0.854**	**0.887**	**0.852**	**0.806**
$Rank\_REC_{i,t-1}$			1.91	3.09	2.28	3.32	2.28	3.30	2.65	3.29	3.37	3.37	**3.09**
					-0.092	-1.125	0.020	-1.122					
$Illegal_{i,t-1}$					-0.19	-1.20	0.04	-1.07					
					-0.717	1.216							
$Illegal_{i,t-1} * Rank\_DIS_{i,t-1}$					-0.80	0.86							
									-0.190	-0.435			
$Ban_{i,t-1}$									-1.73	-0.95			
									-0.330	-0.043			
$Ban_{i,t-1} * Rank\_DIS_{i,t-1}$									-1.01	-0.08			
							-0.304	0.633					
$Illegal_{i,t-1}$* *Q5*							-0.63	0.82					
							-0.665	**-0.699**				**-0.568**	
Q5							-3.25	-3.11				-1.95	
											0.784	0.793	
$Futures_{i,t-1}$											0.16	1.57	
											-0.202		
$Futures_{i,t-1} * Rank\_DIS_{i,t-1}$											-0.35		
												-0.262	
$Futures_{i,t-1}$* *Q5*												-0.57	
													-0.016
Ea_Month													-0.06
													0.454
$Ea\_Month * Rank\_Dis_{\ i,t-1}$													0.76
Country fixed effect	N	Y	N	Y	N	Y	N	Y	N	Y	Y	Y	Y
Month fixed effect	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

4.2.3 Dispersion and ex-post market return in other countries

Yu (2011) shows that in the United States aggregate disagreement is negatively related to the following month's stock market return. In this section, I investigate whether this negative relationship exists for other countries. For each country in my sample, I run the following regression.

$$Unexpect\_Ret_{i,t} = \alpha + \beta_1 * Dis\_Rec_{i,t-1} + \beta_2 * \ Momentum_{i,t} + M_t \ + \varepsilon_{i,t} \qquad (12)$$

Table 7 shows that seven out of these thirty-three countries show the significant negative relationship between dispersion and future stock market return at a 90% confidence level and that on average this negative relationship is higher in emerging countries than in developed countries. In particular, the negative relation between dispersion and future stock market return in the United States is not significantly different from zero. One possible reason could be that whereas Yu (2011) examines only the U.S. market and uses merely the excess raw market returns, I control for the world market performance and test the unexpected market return. This negative dispersion-market return relationship discovered by Yu (2011) is not applicable to all of the other major international markets.[28]

[28] I also use the earnings per share long term growth rate to test the cross-country predictability and the relationship between analysts' dispersions and future market returns. More details are discussed in section 5.2.

Table 7: Time series regression for different countries

This table presents the results of equation (12) in the text. The dependent variable is the unexpected return based on CAPM Redux model. The variable $Dis\_Rec_{i,t-1}$ refers to the country-level recommendation dispersion each month. Panel A shows the results for developed countries whereas Panel B shows the results for emerging countries. Panel C shows the results for the global market as a whole. Coefficients highlighted in **bold** are significant at the 10% level or better.

Panel A: Developed Markets

Country (1)	Dis_Rec_i (2)	T-value (3)	Num. of Obs. (4)
Australia	0.51	0.29	233
Belgium	**-4.37**	-2.18	156
Canada	-1.56	-0.92	217
Denmark	2.28	0.85	112
Finland	**-8.18**	-1.89	206
France	0.96	0.56	233
Germany	1.55	0.74	233
Hong Kong	**-3.31**	-1.85	233
Italy	3.10	1.16	233
Japan	-2.64	-1.12	233
Netherlands	1.56	0.79	220
New Zealand	-0.64	-0.21	50
Norway	3.99	1.35	198
Singapore	-1.75	-1.09	233
Spain	0.22	0.08	233
Sweden	0.78	0.28	233
Switzerland	1.18	0.73	231
United Kingdom	4.57	2.29	233
United States	-0.68	-0.52	233
Average	-0.128	-0.18	-

Panel B: Emerging Markets

Country (1)	$Dis\_Rec_{i,t-1}$ (2)	T-value (3)	Num. of Obs. (4)
Brazil	0.32	0.10	217
China	8.89	2.50	132
India	-1.16	-0.36	233
Indonesia	**-11.30**	-2.95	153
Korea	3.88	1.06	233
Malaysia	-3.90	-1.38	233
Mexico	**-13.53**	-3.15	73
Philippines	**-7.47**	-1.80	56
Poland	3.00	0.73	94
Russia	-0.84	-0.23	106
South Africa	**-5.46**	-2.03	233
Taiwan	-2.62	-1.12	233
Thailand	-5.15	-1.46	233
Turkey	-0.90	-0.12	198
Average	-2.588	-1.63	-

5. Robustness tests

This section provides additional robustness tests. I construct several alternative aggregate analyst dispersion measures and test whether they can produce abnormal returns. I also test the return prediction using longer horizons. Finally, I split the sample into value, and growth since prices of growth stocks increase more contemporaneously with a high level of dispersion compared to value stocks (Yu, 2011). So I expect the growth stocks show a more significant negative relationship between analyst dispersion and future stock returns.

5.1 Alternative constructions of aggregate analyst recommendation dispersion

The base case results are based on the average analyst dispersion using outstanding recommendations that were announced within the last quarter. I focus on the performance of the portfolio of countries in the lowest and highest dispersion quintiles and the hedge portfolio that is buying the former and selling the latter. The first row in Table 7 presents the base case results for each international asset pricing model (repeating the results in Table 5).

Panels A1 to A3 of Table 8 present the results when I consider outstanding recommendations within the last half year, the last year, and the last month, respectively. For all the four asset pricing models, the results are weaker if country-level dispersions are based on a longer window to measure recommendations. When the difference of opinion is based on last six month's recommendations only, two models provide an abnormal return significant at the 90% confidence level, whereas no model generates a significant abnormal return if the dispersion relies on all recommendations outstanding in the last year. Surprisingly, the dispersion based on the last month does not show any predictive ability. A possible reason could be that when using the one-month dispersion construction window compared to the three-month window, the sample size drops by about 45%.

5.2 Alternative proxy for differences of opinion using long-term growth rate

Existing studies argue that long-term growth rate forecast has several advantages when used to calculate differences of opinion. Firstly, the long-term expected growth rate is highly relevant for firm value and is comparable across firms over time (see Moeller, Schlingemann, and Stulz, 2007, Yu, 2011). Secondly, the long-term growth rate might provide a cleaner measure compared to the quarterly earnings forecast, in the sense that low quarterly earnings forecast dispersion may be due to earnings guidance instead of a low level of differences of opinion. Thus I use the long-term growth rate as an alternative proxy for the opinion differences regarding the prospects of individual stocks.

For each firm in each month, the standard deviation of the earnings-per-share (EPS) long-term growth rate (LTG) forecast can be obtained from the unadjusted I/B/E/S summary file. After following the data cleaning criteria discussed in section two, 1,150,845 EPS LTG forecasts are used. However, the sample is heavily tilted toward U.S. sample (the U.S. data makes up about 60% of all the observations) while the remaining 40% is for the other 32 countries. When using the EPS long-term growth rate to calculate the aggregate analyst dispersion, I find limited evidence of abnormal return with this long-short trading strategy. Similar results are obtained if I allow the time-varying risk exposures.

5.3 Aggregate Idiosyncratic Volatility

Apart from using the analyst forecast dispersion as a proxy of heterogeneity, several studies use a volatility based measure of divergence of opinion. For example, Ang, Hodrick, Xing, and Zhang (2006) find a negative relationship between idiosyncratic volatility and stock returns. After controlling for the degree of analyst forecast dispersion, they find that idiosyncratic volatility is still significantly negatively related to future returns, which indicates that the forecast dispersion cannot fully explain the idiosyncratic volatility. Ang, Hodrick, Xing, and Zhang (2009) also extend their sample to 23 developed markets and find that the negative return difference between high idiosyncratic volatility and low idiosyncratic volatility exists in other countries.

It is beyond the scope of this study to determine to what extent aggregate idiosyncratic volatility captures uncertainty, differences of information or differences of opinion. The focus is instead to see whether idiosyncratic volatility aggregated at the country level can provide useful information about the cross-section of stock market returns.

Following Ang et al. (2009), I calculate the idiosyncratic volatility for each country based on the Global Fama-French Five-Factor model. Specifically, I compute the standard deviation of the residuals ($\varepsilon_{c,t}$) after running the following regression using daily MSCI market excess return (expressed in U.S. dollars)[29]:

$$Msci\_Ret\_USD_{c,t} = \alpha + \beta_1 * WMKT_t + \beta_2 * SMB_t + \beta_3 * HML_t + \beta_4 * RMW_t + \beta_5 * CMA_t + \varepsilon_{c,t} \quad (13)$$

Panel C in Table 8 shows that the relative position of lagged aggregate idiosyncratic volatility does not provide useful information on the cross-section of international stock markets. The result is not surprising since Ang et al. (2009) find that the negative spreads between high and low idiosyncratic volatility stocks in other countries commove with the negative spread in the U.S. As a result, the relative level of volatility across different countries might not provide useful information for the stock market performance in the future. Hence, while aggregate idiosyncratic volatility can provide useful information about market returns within most of the countries, it does not contain any useful information for asset allocation across countries.

5.4 Long-horizon return prediction

The unreported tests I find show that the aggregate dispersion difference between the most dispersed quintile and the least dispersed quintile is positively autocorrelated. At the one-month lag, the autocorrelation is significant and about 0.71. This autocorrelation coefficient decreases gradually over time. At the twelve-month lag, the autocorrelation coefficient is down to 0.49, consistent with Yu (2011), indicating half of any shock will decay within one year, and about 80% of a shock will be reversed in four years' time. This evidence suggests that the relative position of the aggregate analyst dispersion would have predictive power over periods longer than one month.

[29] The correlation between recommendation dispersion and idiosyncratic volatility is 0.08 and significant at 1% level in my sample.

However, using long-horizon returns that are overlapping introduces econometric issues regarding hypothesis testing and increase the possibility of rejecting the null hypothesis of zero explanatory power.

When the return horizon is h, the most direct way to solve the overlapping issue is to employ the observations at each horizon h interval. However, using these non-overlapping interval observations lose all in-between information. Thus I follow Hodrick (1992) and use non-overlapping returns without losing in-between information. In particular, I calculate the last several months' average analyst dispersion and run the following regression with the one-month market indices. The intuition of using the alternative estimation procedure is that for stationary series, the coefficient of regressing h-horizon return on last month disagreement is equivalent to the coefficient of regressing h-horizon disagreement on next month return.

$$Msci\_Ret\_USD_{c,t} = \alpha + \beta_1 * \frac{1}{N_t} \sum Rank\_Dis_{\,i,t-1} + \varepsilon_{c,t} \tag{14}$$

Panel D in Table 8 shows the portfolio returns based on the average of analyst dispersion over the last six months. There is a negative relationship between analysts' dispersion and future market returns using the past half year's difference of opinion measure. Unreported results show that returns are similar if portfolios are formed based on the past one and two years' average analyst dispersion and weaker if they are based on the past 36 or 48 months' average dispersion.

5.5 Value versus Growth stocks sample

Yu (2011) shows that shocks to disagreement correlate more with discount-rate news than with cash-flow news (Campbell and Shiller, 1989) and finds that the returns of growth stocks are more significantly related to the contemporaneous market returns of these stocks compared to the returns of the value stocks and thus have a higher beta. If the contemporaneous positive relationships between disagreement and market returns can explain the negative relationship between disagreement and future market returns, a more significant negative relationship will be expected between dispersion and future market returns for growth stocks than for value stocks since the growth stocks go up more contemporaneously. Thus, in this section, I consider the difference between value stocks and growth stocks and split my sample into two parts based on stocks' book to the market ratio in each country as explained below.

I get the annual book value per share of each stock for the United States and Canada from Compustat North America Monthly Updates-Fundamentals Annual and the market to book value for the stocks from the other 31 countries in the sample from DataStream. Following previous studies (Campbell and Vuolteenaho, 2004; Yu, 2011), I also exclude stocks with non-positive book values. Growth stocks are defined as those with highest 30% market to book values whereas value stocks are defined as those with lowest 30% market to book values. Based on this definition, I split the sample into two parts and run the portfolio analysis on value stocks and growth stocks only. If this value versus growth effect exists at a cross-country level, a higher abnormal portfolio return will be obtained using the sample of growth stocks.[30]

Table 8 Panel E1 and Panel E2 show that growth stocks have higher abnormal returns than value stocks, which is in line with the theory that growth stocks on average show a higher level of overpricing compared to the value stocks. Similar results can be obtained if using value-weighted stock returns.

I also form portfolios based on relative positions of the difference between dispersion of growth stocks and dispersion of value stocks for each country to see whether this dispersion difference ranking would pick up growth valuation. However, Table 8 Panel E3 shows the returns are not significantly different from zero.

[30] I require a country needs to have at least 10 firms in one months to be included in the sample considering the sample size drops if split into value and growth groups.

5.6 Post-Regulation Changes Period

The brokerage industry experienced significant regulatory changes in 2002 in the United States and 2003 in Europe. I have shown that recommendations are less informative for the post-regulation period in the first chapter. After the regulation, analyst recommendations are more comparable among different stocks across different countries, so the standard deviation of analyst recommendations may decrease which potentially decreasing the portfolio returns. Panel F of Table 8 shows that the trading strategy of buying the countries with the lowest dispersion and selling the countries with the highest dispersion cannot obtain abnormal returns.

5.7 Developed Countries Only

Table 8 Panel G presents the results if the investment is limited to developed countries only. The abnormal returns are much lower than that obtained when investing in the full sample of countries and not significantly different from zero. This results indicating the hedge return mainly comes from the dispersion differences between developed countries and emerging countries.

5.8 Aggregate Dispersion Changes

Panel H of Table 8 shows the results for a strategy based on the ranking of that country's aggregate analyst dispersion change relative to the previous month aggregate analyst dispersion. The results in Panel H suggests that analyst recommendation dispersion changes provide little information and the abnormal returns are never significant when using analyst dispersion changes as investment criteria. For example, for Fama-French three factors plus Momentum, the average monthly abnormal return is 0.125% (*t*-statistic=0.39). This result is in line with the recommendation changes results in the first chapter of my thesis, where the change measures cannot provide useful information about next month's market performance across different countries.

Table 8: Robustness tests

This table presents the results of additional tests. Panel A presents the intercept from different asset pricing models using alternative definitions of the analyst recommendation dispersion. Panel B shows the results using earnings per share long-term growth forecast. Panel C shows the results using idiosyncratic volatility as a proxy of differences of opinion. Panel D shows the long-horizon portfolio returns using the non-overlapping specification. Panel E shows the results using growth and value stocks only. Panel F shows the results in the post-regulation period. Panel G presents the results using developed countries only. Panel G shows the hedge returns when using the relative position of dispersion changes. Coefficients highlighted in **bold** are significant at the 10% level or better.

Portfolio	World CAPM (1)	CAPM Redux (2)	Global FF 3+Mom (3)	Global FF5 (4)
Baseline Results: P1-P5	0.463	**0.783**	0.463	**0.722**
	1.49	2.53	1.43	2.14
Panel A1: Alternative Constructions of Aggregate Analyst Dispersion (six-month outstanding)				
1 (lowest dispersion)	0.279	0.209	0.279	0.198
	1.28	0.93	1.22	0.85
5 (highest dispersion)	-0.077	-0.481	-0.114	-0.497
	-0.24	-1.64	-0.35	-1.49
P1-P5	0.356	**0.690**	0.393	**0.695**
	1.00	1.95	1.07	1.82
Panel A2: Alternative Constructions of Aggregate Analyst Dispersion (twelve-month outstanding)				
1 (lowest dispersion)	0.006	-0.050	-0.082	-0.059
	0.03	-0.26	-0.43	-0.30
5 (highest dispersion)	-0.145	-0.570	-0.147	-0.501
	-0.44	-1.88	-0.44	-1.44
P1-P5	0.151	0.519	0.066	0.442
	0.43	1.53	0.182	1.17
Panel A3: Alternative Constructions of Aggregate Analyst Dispersion (one-month outstanding)				
1 (lowest dispersion)	0.207	0.179	0.227	0.062
	1.05	0.91	1.13	0.30
5 (highest dispersion)	0.292	0.132	0.292	0.164
	1.08	0.49	1.05	0.57
P1-P5	-0.084	0.047	-0.065	-0.10
	-0.27	0.15	-0.20	-0.30
Panel B: Alternative proxy for differences of opinion (Earnings per share long-term growth rate)				
1 (lowest dispersion)	0.149	0.013	0.150	0.032
	0.83	0.08	0.84	0.17
5 (highest dispersion)	-0.023	-0.285	-0.122	-0.341
	-0.10	-1.32	-0.52	-1.47
P1-P5	0.172	0.299	0.272	0.373
	0.70	1.18	1.06	1.41

Table 8 continued

Panel C: Alternative proxy for differences of opinion (Idiosyncratic Volatility)				
1 (lowest dispersion)	0.183	0.130	0.056	-0.065
	1.33	0.99	0.42	-0.51
5 (highest dispersion)	0.395	0.059	0.428	0.401
	1.35	0.21	1.42	1.27
P1-P5	-0.213	0.071	-0.371	-0.465
	-0.68	0.23	-1.15	-1.38
Panel D: Non-overlapping results based on last six-month dispersion average				
1 (lowest dispersion)	0.149	0.100	0.155	0.125
	0.99	0.66	1.04	0.84
5 (highest dispersion)	-0.100	**-0.468**	-0.121	-0.459
	-0.36	-1.89	-0.43	-1.58
P1-P5	0.249	**0.568**	0.276	**0.584**
	0.93	2.21	0.99	2.036
Panel E1: Using Growth Stocks Only (Equal-weighted Return)				
1 (lowest dispersion)	0.242	0.158	0.205	0.263
	0.96	0.64	0.90	1.12
5 (highest dispersion)	-0.224	**-0.527**	-0.204	**-0.459**
	-0.81	-2.03	-0.78	-1.70
P1-P5	0.466	**0.685**	0.41	**0.722**
	1.64	2.37	1.39	2.35
Panel E2: Using Value Stocks Only (Equal-weighted Return)				
1 (lowest dispersion)	0.416	0.147	0.438	0.341
	1.25	0.45	1.33	0.99
5 (highest dispersion)	**0.949**	0.383	**1.018**	0.563
	2.15	0.94	2.39	1.24
P1-P5	-0.534	-0.236	-0.58	-0.222
	-1.18	-0.52	-1.24	-0.46
Panel E3: Value versus Growth				
1 (lowest dispersion)	0.286	0.183	0.443	0.141
	1.05	0.66	**1.81**	0.52
5 (highest dispersion)	0.137	0.02	0.249	0.004
	0.53	0.08	1.07	0.02
P1-P5	0.149	0.163	0.194	0.136
	0.48	0.51	0.60	0.41
Panel F: Post-Regulation Period (November 2004 to June 2015)				
1 (lowest dispersion)	0.023	0.055	-0.004	-0.055
	0.11	0.28	-0.02	-0.28
5 (highest dispersion)	0	0.068	0.065	-0.039
	0.00	0.31	0.29	-0.17
P1-P5	0.023	-0.013	-0.069	-0.016
	0.09	-0.05	-0.27	-0.06

Table 8 continued

Panel G: Developed Countries Only				
1 (lowest dispersion)	0.125	0.112	0.04	-0.043
	1.08	0.94	0.34	-0.36
5 (highest dispersion)	0.019	-0.144	-0.053	-0.076
	0.09	-0.73	-0.25	-0.35
P1-P5	0.106	0.256	0.093	0.033
	0.48	1.17	0.41	0.14
Panel H: Dispersion Changes				
1 (lowest dispersion)	0.244	0.071	0.372	0.112
	1.01	0.31	1.53	0.44
5 (highest dispersion)	0.281	0.064	0.247	0.119
	1.16	0.27	1.01	0.48
P1-P5	-0.037	0.007	0.125	-0.007
	-0.12	0.02	0.39	-0.02

6. Conclusion

This study shows that recommendation dispersion aggregated at the country level is negatively related to future stock market returns. Depending on employed asset pricing models, the portfolio performance of a self-financing hedge portfolio that buys the stock market indices of the countries with the lowest analyst dispersion and sells the stock market indices of the countries with the highest analyst dispersion yields significant returns. In contrast to the evidence at the firm level, I also show that short selling constraints are not a necessary condition for a stock market to be overpriced. Moreover, this study provides additional evidence on aggregate idiosyncratic volatility predictability and shows that aggregate idiosyncratic volatility does not provide useful cross-country information even though it predicts the stock market performance within each country. Finally, growth stocks show a more significant negative relation between dispersion and the next month's aggregate stock return than value stocks, which provides support for the idea that the contemporaneous positive relationship between dispersion and aggregate stock return is the source of this negative relationship.

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Table A.1: Regression results using unexpected stock market returns and country-level aggregate dispersion

This table presents the results for equations (6) to (11) in the text. The dependent variable is the unexpected return based on Fama-French Five Factor model. The variable $Rank\_DIS_{i,t-1}$ refers to the relative position of the country-level recommendation dispersion each month, where all aggregate dispersions are sorted into five groups. I assign ranks ranging from -0.5 for the smallest quintile to +0.5 for the largest quintile. $Rank\_REC_{i,t-1}$ is also calculated in the similar way but with average recommendation. $Illegal_{i,t-1}$ from column (5) to (8) is the dummy variable where equals to one if the short selling is illegal in a particular month for a particular country. $Futures_{i,t-1}$ is the dummy variable where equals to zero if there is stock market index futures available for the country in that month. $Ban_{i,t}$ is the variable considering the feasibility of short selling activity. Apart from legally banned or not, uptick rules, pre-borrowing requirements (ban on naked short selling), and bans on shorting selected stocks (typically financial stocks) are also considered. $Q5$ is the dummy variable that equals to 1 if the countries are in the highest dispersed group and equals to 0 otherwise. The sample period is from July 1995 to June 2015. The t-statistics are based on standard errors clustered by country. Coefficients highlighted in **bold** are significant at the 10% level or better.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	-0.688	**-0.683**	**-0.515**	**-0.527**	**-0.456**	**-0.637**			-0.174	-0.453	-0.444	
$Rank\_DIS_{i,t-1}$	-3.18	-2.35	-2.18	-1.75	-1.86	-2.33			-0.45	-1.00	-1.04	
			0.646	**0.904**	**0.709**	**0.928**	**0.717**	**0.894**	**0.699**	**0.932**	**0.984**	**0.959**
$Rank\_REC_{i,t-1}$			2.09	3.09	2.29	3.24	2.39	3.20	2.22	3.13	3.15	3.14
					-0.023	-1.463	0.117	-1.375				
$Illegal_{i,t-1}$					-0.04	-1.40	0.21	-1.23				
					-0.424	1.373						
$Illegal_{i,t-1} * Rank\_DIS_{i,t-1}$					-0.53	1.08						
									0.023	-0.571		
$Ban_{i,t-1}$									0.21	-1.12		
									-0.326	-0.050		
$Ban_{i,t-1} * Rank\_DIS_{i,t-1}$									-0.96	-0.09		
							-0.378	0.528				
$Illegal_{i,t-1} * Q5$							-0.80	0.75				
							-0.541	**-0.616**				**-0.537**
$Q5$							-2.65	-2.76				-1.84
											0.640	0.662
$Futures_{i,t-1}$											1.40	1.42
											-0.341	
$Futures_{i,t-1} * Rank\_DIS_{i,t-1}$											-0.57	
												-0.302
$Futures_{i,t-1} * Q5$												-0.74
Country fixed effect	N	Y	N	Y	N	Y	N	Y	N	Y	Y	Y
Month fixed effect	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Table A.2: Regression results using unexpected stock market returns and country-level aggregate dispersion

This table presents the results for equations (6) to (11) in the text. The dependent variable is the unexpected return based on World CAPM model. The variable $Rank\_DIS_{i,t-1}$ refers to the relative position of the country-level recommendation dispersion each month, where all aggregate dispersions are sorted into five groups. I assign ranks ranging from -0.5 for the smallest quintile to +0.5 for the largest quintile. $Rank\_REC_{i,t-1}$ is also calculated in the similar way but with average recommendation. $Illegal_{i,t-1}$ from column (5) to (8) is the dummy variable where equals to one if the short selling is illegal in a particular month for a particular country. $Futures_{i,t-1}$ is the dummy variable where equals to zero if there is stock market index futures available for the country in that month. $Ban_{i,t}$ is the variable considering the feasibility of short selling activity. Apart from legally banned or not, uptick rules, pre-borrowing requirements (ban on naked short selling), and bans on shorting selected stocks (typically financial stocks) are also considered. $Q5$ is the dummy variable that equals to 1 if the countries are in the highest dispersed group and equals to 0 otherwise. The sample period is from July 1995 to June 2015. The t-statistics are based on standard errors clustered by country. Coefficients highlighted in **bold** are significant at the 10% level or better.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$Rank\_DIS_{i,t-1}$	-0.261	-0.323	-0.093	-0.193	-0.092	-0.287			-0.033	-0.224	-0.225	
	-1.55	-1.28	-0.48	-0.75	-0.45	-1.33			-0.1	-0.56	-0.55	
$Rank\_REC_{i,t-1}$			**0.633**	**0.757**	**0.681**	**0.806**	**0.655**	**0.77**	**0.659**	**0.806**	**0.816**	**0.793**
			2.68	3.12	3.05	3.26	2.98	3.18	2.92	3.26	3.25	3.23
$Illegal_{i,t-1}$					0.216	-0.788	0.209	-0.821				
					0.55	-0.82	0.45	-0.75				
$Illegal_{i,t-1} * Rank\_DIS_{i,t-1}$					-0.015	1.333						
					-0.02	1.12						
$Ban_{i,t-1}$									0.093	-0.181		
									1.39	-0.36		
$Ban_{i,t-1} * Rank\_DIS_{i,t-1}$									-0.05	0.079		
									-0.18	0.17		
$Illegal_{i,t-1} * Q5$							0.140	0.752				
							0.33	1.16				
$Q5$							-0.272	**-0.375**				-0.359
							-1.39	-1.81				-1.26
$Futures_{i,t-1}$											0.379	0.346
											0.98	0.86
$Futures_{i,t-1} * Rank\_DIS_{i,t-1}$											0.020	
											0.04	
$Futures_{i,t-1} * Q5$												0.111
												0.28
Country fixed effect	N	Y	N	Y	N	Y	N	Y	N	Y	Y	Y
Month fixed effect	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Table A.3: Regression results using unexpected stock market returns and country-level aggregate dispersion

This table presents the results for equations (6) to (11) in the text. The dependent variable is the unexpected return based on Global Three Factor Plus Momentum model. The variable $Rank\_DIS_{i,t-1}$ refers to the relative position of the country-level recommendation dispersion each month, where all aggregate dispersions are sorted into five groups. I assign ranks ranging from -0.5 for the smallest quintile to +0.5 for the largest quintile. $Rank_REC_{i,t-1}$is also calculated in the similar way but with average recommendation. $Illegal_{i,t-1}$ from column (5) to (8) is the dummy variable where equals to one if the short selling is illegal in a particular month for a particular country. $Futures_{i,t-1}$ is the dummy variable where equals to zero if there is stock market index futures available for the country in that month. $Ban_{i,t}$ is the variable considering the feasibility of short selling activity. Apart from legally banned or not, uptick rules, pre-borrowing requirements (ban on naked short selling), and bans on shorting selected stocks (typically financial stocks) are also considered. *Q5* is the dummy variable that equals to 1 if the countries are in the highest dispersed group and equals to 0 otherwise. The sample period is from July 1995 to June 2015. The t-statistics are based on standard errors clustered by country. Coefficients highlighted in **bold** are significant at the 10% level or better.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$Rank\_DIS_{i,t-1}$	-0.161	-0.144	0.01	-0.013	-0.056	-0.204			-0.095	-0.225	0.136	
	-0.79	-0.54	0.04	-0.05	-0.25	-0.85			-0.26	0.54	0.32	
$Rank\_REC_{i,t-1}$			**0.641**	**0.76**	**0.727**	**0.802**	**0.686**	**0.75**	**0.647**	**0.795**	**0.834**	**0.797**
			2.98	3.07	3.33	3.11	3.38	2.89	2.94	3.1	3.31	3.14
$Illegal_{i,t-1}$					-0.031	-1.251	-0.208	-1.407				
					-0.08	-1.35	-0.38	-1.2				
$Illegal_{i,t-1} * Rank\_DIS_{i,t-1}$					1.016	**2.392**						
					1.83	2.37						
$Ban_{i,t-1}$									**0.145**	-0.39		
									2.14	-0.86		
$Ban_{i,t-1} * Rank\_DIS_{i,t-1}$									0.114	0.298		
									0.37	0.67		
$Illegal_{i,t-1}$* *Q5*							0.934	1.537				
							1.32	1.64				
Q5							-0.253	**-0.38**				-0.107
							-1.21	1.69				-0.35
$Futures_{i,t-1}$											0.307	0.362
											0.81	0.9
$Futures_{i,t-1} * Rank\_DIS_{i,t-1}$											-0.384	
											-0.66	
$Futures_{i,t-1}$* *Q5*												-0.340
												-0.75
Country fixed effect	N	Y	N	Y	N	Y	N	Y	N	Y	Y	Y
Month fixed effect	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y